

**immunogen** A substance capable of eliciting an immune response. See also **antigen**.

**immunoglobulin (Ig)** Any protein that functions as an antibody. An Ig molecule contains two or more identical heavy chains and two or more identical light chains. The five major classes of vertebrate immunoglobulins (IgA, IgD, IgE, IgG, and IgM) differ in the heavy chains they contain, their average serum levels, and their specific functions in the immune response. (See Table 27-1.)

**immunoglobulin (Ig) superfamily** Group of proteins that contain immunoglobulin-fold domains, or structurally related domains, including immunoglobulins, T-cell receptors, MHC molecules, and some cell-adhesion molecules. (See Figure 27-30.)

**induction** In embryogenesis, a change in the developmental fate of one cell or tissue caused by direct interaction with another cell or tissue or with an extracellular signaling molecule; in metabolism, an increase in the synthesis of an enzyme or series of enzymes mediated by a specific molecule (inducer).

**inflammation** Localized tissue response to injury or infection involving an influx of phagocytic and other white blood cells, which mediate removal of antigens and microorganisms, and healing of the damaged tissue.

**initiation factor** One of a group of proteins that promote the proper association of ribosomes and mRNA and are required for initiation of protein synthesis. See also **elongation factor**. (See Figure 4-42.)

**initiator** A eukaryotic promoter sequence for RNA polymerase II that specifies transcription initiation within the sequence. (See Figure 11-35.)

**inositol phospholipids** A family of lipids containing phosphorylated inositol derivatives that are important in signal-transduction pathways in eukaryotic cells. (See Figure 20-29.)

**insulin** A protein hormone produced in the  $\beta$  cells of the pancreas that stimulates uptake of glucose into fat and muscle cells and with glucagon helps to regulate blood glucose levels. Insulin also functions as a growth factor for many cells.

**integral membrane protein** Any membrane-bound protein all or part of which interacts with the hydrophobic core of the phospholipid bilayer and can be removed from the membrane only by extraction with detergent; also called *intrinsic membrane protein*. Most are transmembrane proteins, which span the bilayer and have domains extending on each side of the membrane. (See Figure 14-1.)

**integration** The insertion of one DNA molecule into another. Integration occurs during the lysogenic cycle of bacteriophage  $\lambda$  (see Figure 6-19), infection by retroviruses (see Figure 6-23), and the transposition of mobile DNA elements, including insertion sequences, transposons, and retrotransposons (see Figure 9-14).

**integrins** A large family of heterodimeric cell-surface receptors that promote adhesion of cells to the extracellular matrix by binding to fibronectin, laminin, and other matrix components, or to the surface of other cells by interacting with members of the Ig superfamily. (See Table 24-2.)

**interferon (IFN)** A group of small proteins released from macrophages following stimulation or from many cells after virus infection that bind to tyrosine kinase-linked receptors on target cells inducing changes in gene expression leading to an antiviral state (IFN $\alpha$ , IFN $\beta$ , and IFN $\gamma$ ) or other cellular responses important in the immune response (IFN $\gamma$ ).

**intermediate filaments** Cytoskeletal fibers (10 nm in diameter) formed by polymerization of several classes of cell-specific subunit proteins. They attach to spot desmosomes and hemidesmosomes; form the major structural proteins of skin and hair; form the scaffold that holds Z disks and myofibrils in place in muscle; and generally function as important structural determinants in many animal cells and tissues.

**intermediate-repeat DNA** The eukaryotic DNA fraction that reassociates at an intermediate rate and is derived from mobile DNA elements. This fraction constitutes 25–40 percent of total mammalian DNA. See also **simple-sequence DNA** and **single-copy DNA**.

**interphase** Long period of the cell cycle ( $G_1$ , S phase, and  $G_2$ ) between one mitosis and the next.

**intervening sequence** See **intron**.

**intrinsic protein** See **integral membrane protein**.

**intron** Part of a primary transcript (or the DNA encoding it) that is removed by splicing during RNA processing and is not included in the mature, functional mRNA, rRNA, or tRNA; also called *intervening sequence*.

**inverted repeat** Self-complementary region of a nucleic acid chain containing an axis of symmetry and capable of folding back on itself and base-pairing about this axis of symmetry (e.g., CGCAT . . . . . ATGCG).

**in vitro** Denoting a reaction or process taking place in an isolated cell-free extract; sometimes used to distinguish cells growing in culture from those in an organism (*in vivo*).

**in vivo** In an intact cell or organism.

**ion channel** Any transmembrane protein complex that forms a water-filled channel across the phospholipid bilayer allowing selective ion transport down its electrochemical gradient. See also **ion pump**.

**ionic bond** A noncovalent bond between a positively charged ion (cation) and negatively charged ion (anion).

**ionophore** Any compound that increases the permeability of membranes to a specific ion.

**ion pump** Any transmembrane ATPase that couples hydrolysis of ATP to the transport of a specific ion across a membrane against its electrochemical gradient. The three principal classes of ion pumps—P, V, and F—differ in structure, location, and the ions transported. (See Table 15-3 and Figure 15-10.)

**isoelectric focusing** Technique for separation of molecules based on their charge by gel electrophoresis in a pH gradient subjected to an electric field. A protein migrates to the pH at which its overall net charge is zero; this pH is called the isoelectric point.

**isoforms** Multiple forms of the same protein whose amino acid sequences differ slightly but whose general activity is identical. They may be produced by alternative splicing of RNA transcripts from the same gene or be encoded by different genes.

**isotonic** Referring to a solution whose solute concentration and osmotic strength equals that of a cell so that there is not net movement of water in or out of the cell.

**karyotype** Number, sizes, and shapes of the entire set of metaphase chromosomes of a eukaryotic cell. (See Figure 9-51.)

**kinase** An enzyme that adds the  $\gamma$  phosphate group from ATP to a substrate. (See Figure 7-20 and **phosphorylation**.)

**kinesin** A motor protein that uses the energy of ATP to move along a microtubule, transporting vesicles or particles in the process. (See Figure 23-23.)

**kinetochore** A three-layer protein structure located at or near the centromere of each mitotic chromosome from which microtubules (kinetochore fibers) extend toward the spindle poles of the cell; plays an active role in movement of chromosomes toward the poles during anaphase. (See Figure 23-38.)

**$K_m$**  A parameter that describes the affinity of an enzyme for its substrate and equals the substrate concentration that yields the half-maximal reaction rate; also called the *Michaelis constant*. A similar parameter describes the affinity of a transporter for the transported molecule or the affinity of a ligand, since the kinetics of transport and ligand binding are similar to those of enzymatic reactions. (See F

EXHIBIT

I